Chapter 10: Oceans and Life

Questions — Let's Explore

Q1 How do different features of the ocean floor affect human activities such as fishing, transport, and underwater exploration?

Different features of submarine relief directly shape human use of the sea. The continental shelf — the shallow, submerged edge of a continent — is the richest fishing ground because sunlight penetrates to the seafloor, supporting abundant marine life. It also holds most of the world's offshore oil and gas reserves. Ocean trenches and deep abyssal plains present extreme pressures that complicate underwater exploration, but they attract scientific study. Mid-ocean ridges are important for exploring the seafloor's geological history. For transport, seamounts and shallow shelves are navigational hazards that ships must chart carefully, while deeper ocean basins provide clear, safe passage for large vessels.

Q2 How do waves, tides, and ocean currents influence climate, marine life, and human activities around the world?

Waves shape coastlines through erosion, creating features like sea caves, arches, and stacks, and form beaches through deposition. Storm-driven giant waves (tsunamis) can devastate coastal areas. Tides — caused by the gravitational pull of the Moon and Sun — raise and lower sea levels twice daily, enabling ships to enter shallow harbours safely and supporting fishing communities whose catch improves at high tide; in areas like the Gulf of Kutch and the Gulf of Khambhat, tidal energy can be harnessed for electricity. Ocean currents redistribute heat globally: warm currents like the Gulf Stream keep coastal regions such as Norway ice-free, while cold currents like the Labrador Current create icebergs. Where warm and cold currents meet, nutrient-rich conditions create major fishing grounds.

Q3 Describe the importance of marine resources.

Marine resources are vital to food security, energy, livelihoods, trade, and culture. Fish are a critical source of protein for billions of people, and the fishing and aquaculture industries employ millions, especially in coastal nations like India. Offshore oil and natural gas reserves meet a significant share of global energy needs, and renewable ocean energy — from tides, waves, and currents — holds immense future potential. Approximately 90 per cent of global trade by volume travels by sea, making oceans the backbone of international commerce. Coastal tourism generates billions of dollars annually. Marine minerals, sand, and gravel are important construction and industrial materials. Culturally, objects like the conch shell (shankha) and cowrie shells (kapardika) hold deep significance in Indian tradition. All these resources must be used sustainably to preserve marine ecosystems for future generations.

Q4 Draw a poster that encourages people to protect marine resources. Include a slogan (like Save Our Seas or Fish for the Future) and explain your message in 2–3 sentences.

Guidance: Draw a colourful ocean scene showing fish, coral reefs, and a coastline. Add a bold slogan such as 'Save Our Seas — Our Future Depends on It'. In 2–3 sentences below the image, explain that oceans provide food, energy, and livelihoods to millions of people; that overfishing, pollution, and climate change are destroying marine ecosystems; and that every individual can help by reducing plastic use, supporting sustainable seafood, and respecting protected marine zones.

Q5 Using a map of India, mark at least five coastal states that might need tsunami warnings.

Guidance: On an outline map of India, mark these coastal states and union territories that are vulnerable to tsunamis: Tamil Nadu (eastern coast, severely affected in 2004), Andhra Pradesh (eastern coast), Odisha (Bay of Bengal coast), Kerala (southwestern coast), and the Andaman and Nicobar Islands (directly in the Indian Ocean, worst hit in 2004). You may also mark Puducherry and Karnataka. Label each location clearly and add a legend indicating tsunami-prone zones. Note that the eastern (Bay of Bengal) coast is generally at greater risk because of its proximity to the Sunda subduction zone.

Q6 Work in a group and act out what would happen when a cyclone warning is issued. Highlight what role different people, like scientists, officials, and coastal villagers, would play.

Guidance: Divide the group into three roles — scientists at INCOIS/IMD, government officials, and coastal villagers. Scientists detect the storm using seismic sensors and satellites and issue an early warning; officials activate the NCRMP Decision Support System, coordinate evacuations, and open cyclone shelters; villagers receive SMS and broadcast alerts, gather essential supplies, move to higher ground or designated shelters, and follow official instructions. In your roleplay, show how each group communicates with the next, emphasising that timely action at every level saves lives.

Q7 Suppose a foreign ship is sailing through India's territorial sea. What principle allows the ship to pass through these waters, subject to certain conditions?

The principle of Innocent Passage allows a foreign ship to pass through a country's territorial sea as long as it does not threaten the country's peace, good order, or security. Under this principle, the ship must move continuously without stopping, except in an emergency or breakdown. It may not engage in fishing, military operations, or any other non-peaceful activity while in territorial waters. India, like all coastal states under UNCLOS, recognises this right, which balances the sovereignty a nation holds over its 12 nautical mile territorial sea with the need for unobstructed international navigation.

Q8 A country has an Exclusive Economic Zone (EEZ) extending up to 200 nautical miles from its baseline. What rights does the country have over the natural resources in this zone?

Within its EEZ, a country has special sovereign rights to explore, exploit, conserve, and manage all natural resources — living and non-living — of the sea, seabed, and subsoil. This includes the right to fish, extract oil and natural gas, harvest minerals, and develop renewable energy from tides, waves, and winds. The country may also regulate scientific research and the construction of artificial structures in this zone. However, the EEZ does not give the country full ownership or control over the water itself; ships and aircraft from other countries retain the right of free navigation and overflight. These rights are defined under the United Nations Convention on the Law of the Sea (UNCLOS).

Q9 Create a model of an ocean with ship routes, protected zones, and safety measures. Based on the model, explain how it follows maritime laws and protects the ocean.

Guidance: Build a model (using a tray with blue-painted cardboard or clay) that shows: a coastline with internal waters close to shore; a 12 nautical mile territorial sea band; a contiguous zone up to 24 nautical miles; an EEZ band extending to 200 nautical miles; and the high seas beyond. Mark ship routes passing through using arrows, showing them following COLREGs (passing on the correct side, maintaining safe speed). Designate a shaded 'Marine Protected Area' within the EEZ. Add small symbols for a tsunami detection buoy and a cyclone warning tower near the coast. In your explanation, describe how the territorial sea boundary enforces innocent passage, the EEZ grants fishing and resource rights, COLREGs prevent ship collisions, MARPOL standards prevent pollution, and the early warning systems protect coastal communities from natural hazards.